



1 Solve $\frac{w}{4} + 2 = 9$

(2 marks)

Keep the two sides equal by applying the same operation to both. Undo the addition first, then undo division by 4

$$\begin{array}{rcl} \frac{w}{4} + 2 & = & 9 \\ -2 & & -2 \\ \hline \frac{w}{4} & = & 7 \\ \times 4 & & \times 4 \\ \hline w & = & 28 \end{array}$$

$w = 28$

2 Solve

a. $x - 8 = -3$

b. $4x + 15 = 7$

c. $10 - 2x = 16$

(3 marks)

a)

$$\begin{array}{rcl} x - 8 & = & -3 \\ +8 & & +8 \\ \hline x & = & 5 \end{array}$$

b)

$$\begin{array}{rcl} 4x + 15 & = & 7 \\ -15 & & -15 \\ \hline 4x & = & -8 \\ \div 4 & & \div 4 \\ \hline x & = & -2 \end{array}$$

c)

$$\begin{array}{rcl} 10 - 2x & = & 16 \\ -10 & & -10 \\ \hline -2x & = & 6 \\ \div (-2) & & \div (-2) \\ \hline x & = & -3 \end{array}$$

$x = 5, x = -2, x = -3$

3 Solve $5(x - 2) = 3x + 8$

(3 marks)

Expand the bracket

$$\begin{array}{rcl} 5x - 10 & = & 3x + 8 \\ - & & - \\ 2x - 10 & = & 8 \\ +10 & & +10 \\ 2x & = & 18 \\ \div 2 & & \div 2 \\ x & = & 9 \end{array}$$

Check

$$5(9 - 2) = 35 \text{ and } 3(9) + 8 = 35$$

$$x = 9$$

4 Solve $3(2x - 5) - 2(x - 4) = -15$

(3 marks)

$$3(2x - 5) - 2(x - 4) =$$

Expand: $-2 \times -4 = +8$

$$\begin{array}{rcl} 6x - 15 - 2x + 8 & = & - \\ - & & - \\ 4x - 7 & = & - \\ +7 & & +7 \\ 4x & = & - \\ \div 4 & & \div 4 \\ x & = & -2 \end{array}$$

$$x = -2$$

5 Solve $\frac{4x + 1}{3} = x + 3$

(3 marks)

$$\begin{array}{rcl} \times 3 & 4x + 1 & = 3x + 9 \quad \times 3 \\ - & & - \\ x + 1 & = & 9 \\ - & & - \\ x & = & 8 \end{array}$$

Check

$$\frac{32 + 1}{3} = 11 \text{ and } 8 + 3 = 11$$

$$x = 8$$

6

Dan and Ella share 45 sweets.

Ella gets 7 more sweets than Dan.

Dan says, "I got 20 sweets."

Is Dan right? You must show how you get your answer.

(3 marks)

Let d be the number of sweets Dan gets, so Ella gets $d + 7$

$$d + d + 7 = 45$$

$$2d = 38, \text{ so } d = 19$$

Check

$$19 + 26 = 45$$

Dan is wrong, he got 19 sweets, not 20

No, Dan got 19 sweets

7

Solve

a. $\frac{x}{2} + \frac{x}{3} = 10$

b. $\frac{3x-2}{4} = \frac{x+6}{2}$

(4 marks)

a) $\times 6$ clears both fractions

$$\frac{x}{2} + \frac{x}{3} = 10$$

$$\times 6 \quad 3x + 2x = 60 \quad \times 6$$

$$5x = 60$$

$$\div 5 \quad x = 12 \quad \div 5$$

b)

$$\frac{3x-2}{4} = \frac{x+6}{2}$$

$$\times 4 \quad 3x - 2 = 2(x + 6) \quad \times 4$$

$$3x - 2 = 2x + 12$$

$$x - 2 = 12$$

$$+2 \quad x = 14 \quad +2$$

$$x = 12, x = 14$$

8

At a cinema, an adult ticket costs £4 more than a child ticket.

Mrs Adeyemi buys 2 adult tickets and 3 child tickets. She pays £38 altogether.

Work out the cost of one child ticket.

(3 marks)

$$\text{Child} = c, \text{adult} = c + 4$$

$$2(c + 4) + 3c = 38$$

$$2c + 8 + 3c = 38$$

$$5c + 8 = 38$$

$$5c = 30$$

÷5

$$c = 6 \quad \div 5$$

$$\text{Check: } 2 \times 10 + 3 \times 6 = 38$$

£6

9

a. Make r the subject of the formula $A = \pi r^2$

b. Make u the subject of the formula $v^2 = u^2 + 2as$

(4 marks)

a)

$$\pi r^2 = A$$

÷π

$$r^2 = \frac{A}{\pi}$$

÷π

√

$$r = \sqrt{\frac{A}{\pi}}$$

√

b)

$$u^2 + 2as = v^2$$

$$u^2 = v^2 - 2as$$

√

$$u = \sqrt{v^2 - 2as}$$

√

$$r = \sqrt{\frac{A}{\pi}}, u = \sqrt{v^2 - 2as}$$

10 Make x the subject of the formula

$$5(x + 2y) = w + 3x$$

(3 marks)

Expand the bracket

$$\begin{array}{rcl} 5x + 10y & = & w + 3x \\ 2x + 10y & = & w \\ 2x & = & w - 10y \\ \div 2 & & \div 2 \\ x & = & \frac{w - 10y}{2} \end{array}$$

$$\boxed{x = \frac{w - 10y}{2}}$$

11 Factorise

a. $x^2 + 7x + 12$

b. $x^2 - 2x - 15$

c. $x^2 - 81$

(3 marks)

a) Multiply to 12, add to 7

$$3 \times 4 = 12, 3 + 4 = 7$$

$$\boxed{(x + 3)(x + 4)}$$

b) Multiply to -15, add to -2

$$\boxed{(x - 5)(x + 3)}$$

c) Difference of two squares

$$x^2 - 81 = x^2 - 9^2$$

$$\boxed{(x + 9)(x - 9)}$$

12 Solve $x^2 - 5x - 24 = 0$

(3 marks)

Find two numbers that multiply to -24 and add to -5: they are -8 and 3

Factorise

$$(x - 8)(x + 3) = 0$$

$$\text{So } x = 8 \text{ or } x = -3$$

$$\boxed{x = 8 \text{ or } x = -3}$$